

Engineering Design File

PROJECT NO. 23927

Area-Based Approach to Identify Type IV Waste for the Accelerated Retrieval Project I



EDF No.: 5601 EDF Rev. No.: 0 Project File No.: 23927

1. Title: <u>Area-Based Approach to Identify Type IV Waste for the Accelerated Retrieval Project I</u>				
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5. Summary: Excavation of the Accelerated Retrieval Project (ARP) I retrieval area within Pit 4 will be conducted in two lots, with Lot 1 encompassing the quarter acre in the west end of the retrieval area. Waste burial records indicate that Lot 1 contains all five targeted waste types: Rocky Flats Plant (RFP) Series-741 sludge, RFP Series-743 sludge, filters, graphite, and roaster oxide. The ARP I, in conjunction with the Central Characterization Project, will designate the waste material types for retrieved Pit 4 materials. Disposal records provide a basis for identifying "areas" within Pit 4 that contain Type IV material and "areas" that contain no Type IV materials. A retrieval strategy has been developed that confirms Type IV waste was not disposed in the first 32 ft of the ARP I retrieval area. This includes a 20-foot buffer zone that takes into account disposal location uncertainties. Any materials generated from this area should be labeled as non-Type IV wastes. Therefore, heated gas generation testing will not be required to certify drums that contain materials retrieved from the non-Type IV zone for shipment to the Waste Isolation Pilot Plant. The recommendation is made to revise the appropriate procedures to implement this non-Type IV waste identification approach for the ARP I.				
6. Review (R) and Approval (A) and Acceptance (Ac) Signatures: (See instructions for definitions of terms and significance of signatures.)				
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Area-Based Approach to Identify Type IV Waste for the Accelerated Retrieval Project I

1. BACKGROUND

Transportation of transuranic waste, in compliance with the Transuranic Package Transporter Model II *Contact-Handled Transuranic Waste Authorized Methods for Payload Control (CH-TRAMPAC)* (NRC Docket 71-9218, 2004), requires that the waste material type be identified prior to shipment to the Waste Isolation Pilot Plant (WIPP). Each waste type has designated shipping limits, i.e., decay heat, hydrogen and total gas generation rates. A Type IV waste designation results when materials contain $\geq 5\%$ by weight of CH-TRAMPAC-identified solidified organics. Type IV waste requires heated gas generation testing to demonstrate compliance with gas generation limits.

2. ISSUE

Excavation of the 0.5 acre Accelerated Retrieval Project (ARP) I retrieval area within Pit 4 will be conducted in two lots, with Lot 1 encompassing the quarter acre in the west end of the retrieval area. Waste burial records indicate that Lot 1 contains all five targeted waste types: Series-741 sludge, Series-743 sludge, filters, graphite, and roaster oxide. Rocky Flats Plant (RFP) Series-743 sludge comprises the targeted Type IV waste in Pit 4. Proper identification of Type IV wastes is key to compliance with shipping limits.

3. PROPOSED APPROACH

The ARP I, in conjunction with the Central Characterization Project, will designate the waste material type for all retrieved Pit 4 materials, based on acceptable knowledge and visual examination data. The purpose of this document is to develop an approach for the identification of “non-Type IV” waste zones within the ARP I retrieval area in order to most efficiently manage the characterization of retrieved waste through the limited gas generation testing resources. Disposal records (see EDF-4478, “Waste Inventory of the Described Area within Pit 4 for ARP within the Radioactive Waste Management Complex”) provide a basis for identifying “areas” within Pit 4 containing RFP Series-743 sludge materials and “areas” that contain no RFP Series-743 sludge materials. The following discussion is provided to summarize the identification of non-Type IV zones within the ARP I retrieval area.

4. DISPOSAL LOCATION ASSESSMENT

An evaluation of the RFP Series-743 sludge locations in the ARP I retrieval area was performed based on the trailer load lists for RFP shipments. Shipment data and waste disposal locations within the Subsurface Disposal Area Pits are currently located in the Idaho National Laboratory’s “Waste Inventory Location Database.”^a The information in the Waste Inventory Location Database has been reduced and documented in EDF-4478. EDF-4478 summarized the disposal locations of the waste by retrieval area. This EDF-5601 has evaluated the full scope of shipments as identified in EDF-4478; however, specific coordinates for the RFP Series-743 sludge disposal locations were used as the basis for this assessment. Using this information, an RFP Series-743 disposal location summary was generated. Figure 1 shows the RFP Series-743 sludge historical shipment data overlaid on a grid of the ARP I retrieval area. The squares

a. ICP/EXT-04-00271, 2/23/05, *Waste Information and Location Database Update for the OU 7-13/14 Project* (Draft), Idaho National Laboratory.

represent 15 by 15-ft areas. Red areas show where RFP Series-743 sludge is located. Based on disposal records, Figure 1 shows that the RFP Series-743 sludge is generally grouped in the northern end of the retrieval area, starting north central and continuing northeast. Disposal records also show the RFP Series-744 sludge is grouped in this same portion of the retrieval area.

743 Disposal Locations

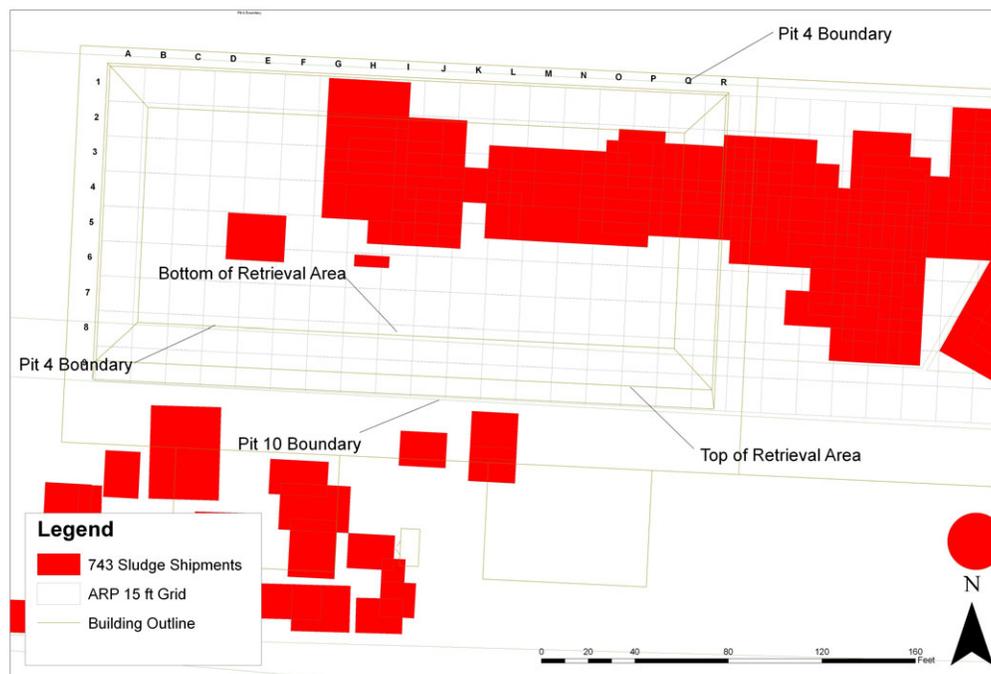


Figure 1. RFP Series-743 sludge locations in the ARP I retrieval area based on disposal records.

Pit 4 disposal patterns and RFP waste generation operations support the Waste Inventory Location Database information. Disposal of waste in the ARP I retrieval area generally occurred from west to east over the disposal time period. The first occurrence of RFP Series-743 sludge in the ARP I retrieval area (westernmost red box in Figure 1), coincides with the very first shipment of RFP Series-743 sludge from RFP (Miller and Varvel, 2001). Therefore RFP Series-743 sludge should not be located any further to the west (earlier in the disposal time frame) than identified in Figure 1.

Data from shallow gas surveys taken around the ARP I retrieval area support the disposal locations of the RFP Series-743 sludge locations identified in Figure 1. RFP Series-743 sludge is primarily composed of solidified oil (e.g., Texaco Regal Oil^b) and volatile organic compounds. A predominant volatile organic compound is carbon tetrachloride (CCl₄). Gas survey samples were collected at locations 30 in. below the soil surface and were analyzed for CCl₄. Figure 2 shows the combined results from two surveys for the ARP I retrieval area and surroundings (the approximate boundaries of the excavation pit are shown in pink). Areas with no color in the west (left) area of the pit are a result of no sampling data being taken,

b. References herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise, does not necessarily constitute or imply its endorsement, recommendation, or favoring by the U.S. Government, any agency thereof, or any company affiliated with the Idaho National Laboratory.

rather than an indication of very low CCl_4 concentrations. Boxes are included to represent approximate locations, based on shipping records, of the RFP Series-743 sludge. Comparison of the results from Figures 1 and 2 shows a general agreement between the RFP Series-743 sludge locations, based on historical disposal data and soil sample CCl_4 concentrations.

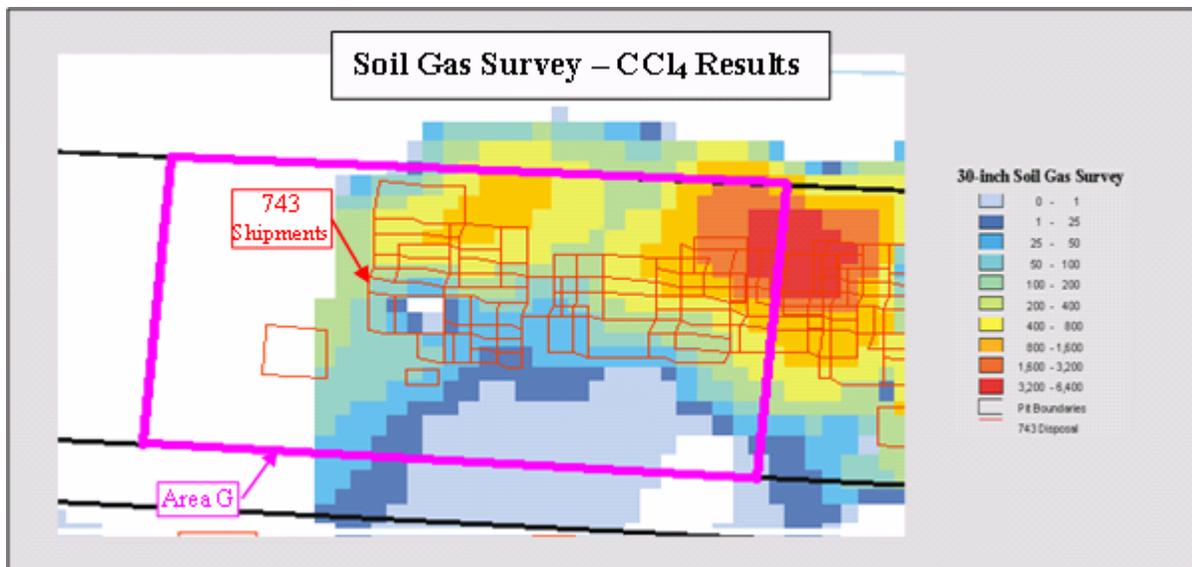


Figure 2. Results from the soil gas surveys for carbon tetrachloride.

There are several sources of uncertainty for the area-based approach to identifying organic waste disposal locations in the ARP I retrieval area. These include the errors in pit and trench boundary markers, shipment placement (i.e., centroid and spread), collection of the geophysical data used to ground truth the shipments, and identification of the ARP I building location and interior grids. These positional errors are not additive; the largest identified error is the best estimator of error uncertainties. For the Pit 4 area boundaries, the maximum documented error is +/- 20 feet, based on Yokuda (1992). This positional error analysis is documented in EDF-5792, "Positional Error Estimates for the Buried Waste Location Database in the Vicinity of the Accelerated Retrieval Project."^c

The uncertainties attributed to the disposal location result in a conservative zone, 20 ft beyond the RFP Series-743 disposal locations, where materials could be located that would exceed the 5% by weight organic concentration criterion. Applying a 20-ft "buffer zone" around the waste disposal locations and overlaid upon a grid of the ARP I area produced the results shown in Figure 3. The western boundary of the zone of uncertainty would be at 32 ft. Material excavated from within the RFP Series-743 sludge waste zone, or within the buffer zone, could potentially fall within the definition of a Type IV waste. Material excavated outside this boundary, although targeted for disposal at WIPP, will not be categorized as Type IV waste.

Figure 4 shows the area-based strategy for segregating the non-Type IV waste retrieval area from areas that potentially contain Type IV waste. The dashed vertical line in the center represents the boundary of the Lot 1 excavation at 131.9 ft. Using this strategy, no solids or soils in the west end of the

c. EDF-5792, 2005, "Positional Error Estimates for the Buried Waste Location Database in the Vicinity of the Accelerated Retrieval Project", Rev. 0 (Draft), Idaho Completion Project.

ARP I, Lot 1 area require classification as Type IV waste, because this area contains no RFP Series-743 sludge.

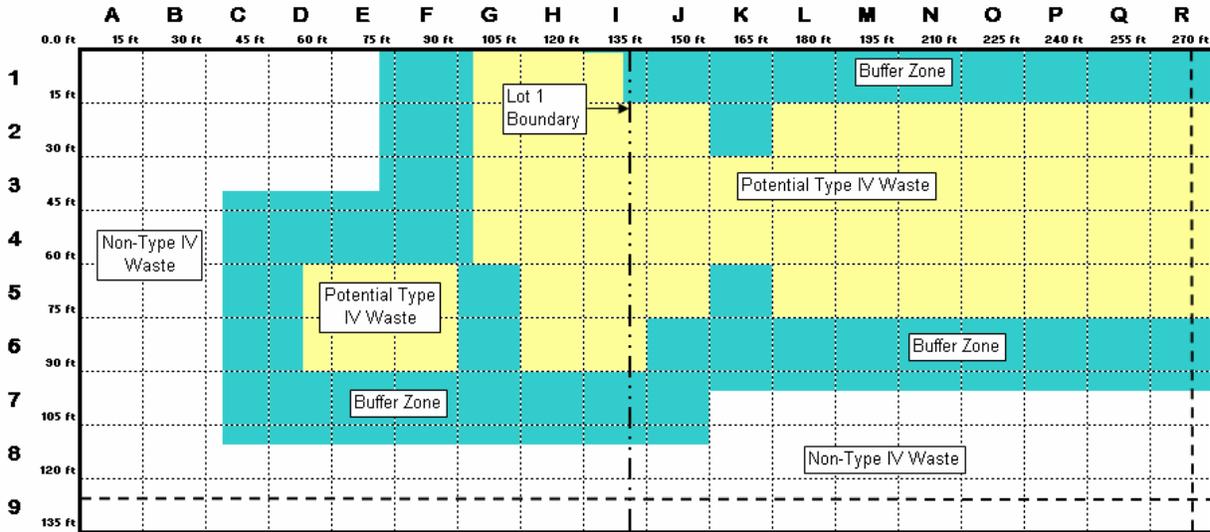


Figure 3. RFP Series-743 sludge location within the ARP I retrieval area, including a buffer zone.

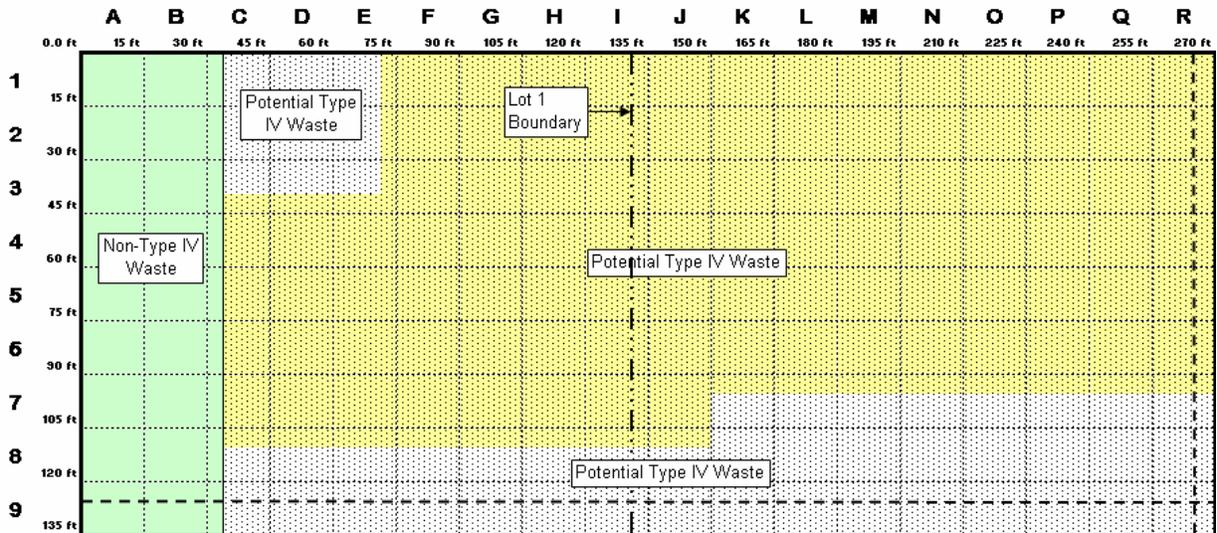


Figure 4. Area-Based Type IV waste identification.

5. IMPLEMENTATION

Implementation of the area-based approach requires revision of appropriate Central Characterization Project acceptable knowledge documents to designate/document that wastes retrieved inside this area are non-Type IV waste. The eastern boundary for the non-Type IV waste area is at 32 ft. Any wastes generated from this area are a non-Type IV and will not require heated gas generation testing

to demonstrate compliance with the CH-TRAMPAC. Waste retrieved from this area will need to be tracked. It is proposed that an area demarcation methodology be evaluated and procedures developed or modified to record the retrieval location of waste materials.

6. REFERENCES

1. EDF-4478, 2004, "Waste Inventory of the Described Area within Pit 4 for the Accelerated Retrieval Project within the Radioactive Waste Management Complex," Rev. 2, Idaho Completion Project.
2. NRC Docket 71-9218, 2004, *Contact-Handled Transuranic Waste Authorized Methods for Payload Control, (CH-TRAMPAC)*, Rev. 1.
3. Yokuda, Eileen, 1992, *Locations of Pits, Trenches, and Soil Vault Rows*, EDF ERP WAG7 05, Rev. 2, Idaho National Laboratory.